TO: Gerald Bowes, Ph.D.
Manager, Cal/EPA Scientific Peer Review Program
Office of Research, Planning and Performance
State Water Resources Control Board
Post Office Box 100
Sacramento, CA 95812-0100

FROM: Adam Laputz
Assistant Executive Officer
CENTRAL VALLEY WATER BOARD

DATE: 21 October 2016

SUBJECT: REQUEST FOR EXTERNAL PEER REVIEW OF THE SCIENTIFIC BASIS OF WATER QUALITY CRITERIA FOR THE PROTECTION OF AQUATIC LIFE FOR THE PESTICIDE FIPRONIL

Staff of the Central Valley Regional Water Quality Control Board (Central Valley Water Board) requests that you initiate the process to identify external scientific peer reviewers for the water quality criteria derivation for the pesticide fipronil per the requirements of Health and Safety Code Section 57004. The scientific basis for the water quality criteria derivation is contained in the technical report titled *Draft Water and Sediment Quality Criteria for Fipronil*. This is the primary scientific document submitted for review.

The report contains the scientific basis for the derivation of water quality criteria for the pesticide fipronil and four of its degradates in both water and sediments. The water quality criteria are science-based concentrations which would be consistent with conditions that are protective of aquatic life in California's Central Valley. They consist of the following elements:

1. Acute and chronic water quality criteria based on animal toxicity data;
2. Consideration of water quality effects, including bioavailability, mixtures with other chemicals, and environmental conditions such as temperature and pH;
3. Consideration of sensitive species, threatened and endangered species, and ecosystem and indirect effects; and
4. Consideration of effects in other environmental compartments, such as soil and air.

Expected Date the Documents will be Available for Review
15 November 2016

Requested Review Period
We request that scientific peer review be accomplished within the normal review period of thirty (30) days.

Length of Documents and References
The primary document is approximately 80 pages long, not including appendices. References cited in the primary documents will be provided to reviewers upon request.

Suggested Areas of Expertise for Reviewers
The Draft Report is comprehensive and encompasses numerous disciplines. We suggest that several reviewers with varying expertise are appropriate for this project. Scientific peer reviewers should have expertise in the following fields:

- **Aquatic toxicology**
  Expertise in ecotoxicology, particularly pollutant effects on aquatic invertebrates, aquatic toxicology of pesticides, toxicity test methods, and statistical analysis of ecotoxicology data.
  This expertise is needed for conclusions 1, 2, 3, 4 and 5 regarding the collection and screening of physical-chemical ecotoxicity data, the calculation of acute and chronic criteria, and consideration of adjustments to the criteria.
- **Risk assessment of aquatic pollutants**
  Derivation of water quality criteria for pesticides is a type of ecological risk assessment that determines an acceptable magnitude, duration, and frequency of pesticide exposure to aquatic organisms that if not exceeded, will not produce adverse effects to aquatic life.
  This expertise is needed for all of the conclusions.
- **Ecology of aquatic invertebrates and food web effects**
  This expertise is needed particularly for conclusions 5 and 6 regarding adjustments to criteria and the assumptions, limitations, and uncertainties of criteria derivation.

Contact Information
Tessa Fojut is the project manager: Tessa.Fojut@waterboards.ca.gov (916) 464-4691. If Tessa is not available, please contact Daniel McClure: Daniel.McClure@waterboards.ca.gov (916) 464-4751.

Attached please find (1) a plain English summary of the Draft Water Quality Criteria Reports, (2) a list of the specific scientific findings and conclusions that we would like the reviewers to address, and (3) a list of the persons who have participated in the development of the draft documents.

cc: Mr. Rik Rasmussen, Division of Water Quality, State Water Resources Control Board, Sacramento

Attachment 1

WATER QUALITY CRITERIA FOR THE PESTICIDE FIPRONIL FOR CALIFORNIA'S CENTRAL VALLEY

Plain English Summary of the Water Quality Criteria Report

Fipronil is a phenylpyrazole insecticide primarily used for structural pest control of ants and termites. Fipronil and several of its degradates have relatively high toxicity to aquatic organisms and are frequently detected in water bodies throughout California, particularly those receiving urban runoff. Fipronil and degradates have been detected in both water and sediment samples. Fipronil use has been steadily increasing over the years 2010-2014. Because of these factors, Central Valley Water Board staff identified the need for numeric water quality criteria for the protection of aquatic life for fipronil and several degradates in both water and sediment matrices. The degradates that are considered for water quality criteria are fipronil-sulfide, fipronil-sulfone, fipronil-desulfinyl, and fipronil-carboxamide. The Central Valley Water Board has narrative water quality objectives for pesticides and toxicity in its water quality standards, but does not have numeric fipronil water quality objectives. The narrative water quality objective for toxicity states that "All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life." The goal for the numeric criteria is that they are consistent with the narrative water quality objective for toxicity. These water quality criteria may be used to further assess water quality data for these constituents.

In 2005, the Central Valley Water Board contracted with the University of California Davis to develop a methodology to derive water quality criteria for the protection of aquatic life for pesticides. The methodology was developed in two phases. Phase I was a review of available methods worldwide. The rationale for the development of the UC-Davis methodology and the methodology itself are contained in the Phase II report.

Currently, the Central Valley Water Board has contracted with the University of California Davis to apply the UC-Davis method to derive water quality criteria for the insecticide fipronil. The criteria report includes the data sets used in criteria calculation, the calculations of acute and chronic criteria, and any other considerations in determining the final criteria, such as water quality effects, data for sensitive species, threatened and endangered species, and mesocosm studies.

Primary Document

Water Quality Criteria Report for Fipronil (~80 pages, plus appendices)

Descriptions of the key technical topics for review in the Draft Water and Sediment Quality Criteria Report are given in Attachment 2.

Attachment 2

WATER QUALITY CRITERIA FOR THE PESTICIDE FIPRONIL FOR CALIFORNIA'S CENTRAL VALLEY

Description of Scientific Basis for the Draft Water Quality Criteria to be addressed by Peer Reviewers

The statutory mandate for external scientific review (Health and Safety Code Section 57004) states that it is the reviewer's responsibility to determine whether the scientific portion of the proposed rule is based upon sound scientific knowledge, methods, and practices. Staff are not currently proposing a rule, but because the water quality criteria could be used as the basis for a proposed rule in the future, staff is requesting that the reports are reviewed using the process that is outlined in Health and Safety Code Section 57004 for consistency.

Water quality criteria were derived according to the University of California – Davis Methodology; this method is available at: http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/criteria_method/index.shtml.

The UC-Davis Method went through scientific peer review in accordance with Health and Safety Code Section 57004 as part of a project entitled "Central Valley Pyrethroid Pesticides TMDL and Basin Plan Amendment" and the results of that review are available at: http://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/pyrethroid_tmdl_bpa/index.shtml.

Interim bioavailable sediment criteria were derived according to the DRAFT University of California – Davis Sediment Methodology; this method is available at: http://www.swrcb.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/central_valley_pesticides/sediment_quality_criteria_method_development/index.shtml.

The DRAFT University of California – Davis Sediment Methodology was not finalized due to a lack of spiked-sediment toxicity test data for diverse species to use to vet the Draft Sediment Method. However, interim bioavailable sediment criteria were derived for fipronil in order to provide available information on effect levels in sediments and highlight data gaps to spur future studies. Because there remains considerable uncertainty in the UC Davis Sediment Criteria Derivation Methodology, the interim bioavailable sediment quality criteria are not recommended to be applied as regulatory values.

The assumptions, findings, and conclusions that constitute the scientific portions of the Draft Water and Sediment Quality Criteria Report are identified and listed below. We request that the scientific peer reviewers make a determination whether each of the

identified assumptions, findings, and conclusions is based upon sound scientific knowledge, methods, and practices.

1. The physical-chemical data for fipronil and its degradates is accurate and complete.

Physical-chemical data are required for determining the environmental fate of a chemical as well as for determining the quality of toxicity tests (e.g., determining whether test concentrations exceeded solubility), thus accurate and complete physical-chemical data is an important aspect of criteria derivation.

The review should focus on Section 3 (Physical-Chemical Data) of the Draft Water and Sediment Quality Criteria Report. Section 3-2.2.1 of the UC Davis Methodology and section 2.1.2 of the DRAFT UC Davis Sediment Methodology are the related references.

2. Ecotoxicity data screening resulted in a high quality (relevant and reliable) data set for criteria derivation and did not result in removal of pertinent high quality data from the data set used for criteria derivation.

The data screening process determines which specific toxicity results will be used for criteria calculation, thus only relevant and reliable data should remain in the final data set. The relevant and reliable data are further prioritized in order to result in robust and appropriately protective criteria. It is also important that high quality data are not screened out of the final data set used for criteria calculation.

The review should focus on Sections 4, 5 and 6 and Appendices A, B, C and D of the Draft Water and Sediment Quality Criteria Report, regarding human and wildlife dietary values, ecotoxicity data, data reduction, and individual study screening summaries. Sections 3-2.2.2 and 3-2.4 of the UC Davis Methodology and sections 2.1.3, 2.3, and 2.5 of the DRAFT UC Davis Sediment Methodology are the related references.

3. The acute water quality criteria, if attained, are likely to protect aquatic organisms from harmful physiological effects that result from short-term exposures to fipronil and/or its degradates and the criteria calculated are technically valid. The acute water quality criteria are unlikely to be either under- or overprotective.
    a. The acute criteria derived via assessment factors, described below, result in criteria that are valid and protective and are not overly conservative.

To calculate acute criteria using the UC Davis Method a species sensitivity distribution is fit to the acute data set if five required taxa are available. If the five required taxa are not fulfilled, then there are too few data to fit a statistical distribution, and instead the lowest acute toxicity value is divided by an assessment factor in order to estimate the 5^{th} percentile of the distribution. The assessment factors were determined for the UC Davis method based on acute data sets for 16 pesticides, including organochlorines, organophosphates, and pyrethroids. The magnitude of the assessment factors decrease as the number of available taxa increases because the uncertainty of lacking

a sensitive species decreases. Assessment factors are commonly used in criteria methodologies to calculate criteria when few toxicity data are available and the UC Davis method is the only source of assessment factors based solely on pesticide data. The 5th percentile value (either determined from the species sensitivity distribution or estimated with an assessment factor), is divided by 2 to calculate an acute criterion because this provides an estimate of a no-effect level from lethal effect toxicity values.

Fipronil: A species sensitivity distribution (SSD) was used to calculate the acute criterion of fipronil. There were 17 acute values available that fulfilled the five required taxa for an SSD. The median 5th percentile of the SSD was divided by a factor of 2 to calculate the acute criterion for fipronil.

Fipronil-sulfide: An assessment factor was used with the available acute toxicity data for fipronil-sulfide to calculate the acute criterion. The lowest acute toxicity value for fipronil-sulfide was for the midge *Chironomus dilutus*, which was divided by an assessment factor of 12 to estimate the 5th percentile of the species sensitivity distribution for fipronil-sulfide. The estimated 5th percentile value was then divided by 2 to calculate the acute criterion. The assessment factor used is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil-sulfide. The assessment factor of 12 was used because the acute fipronil-sulfide data set fulfilled two of the required taxa to fit a species sensitivity distribution. Using an assessment factor is a conservative approach for calculating the fipronil-sulfide acute criterion, which is reasonable because so little acute toxicity data is available for this pesticide.

Fipronil-sulfone: A species sensitivity distribution was used to calculate the acute criterion of fipronil-sulfone. There were 15 acute values available that fulfilled the five required taxa for an SSD. There was a significant lack of fit of the Burr Type III distribution, which is initially recommended when there are more than 8 data points. Thus, the log-logistic distribution was fit to the data because this distribution has fewer fitting parameters and the log-logistic distribution did not have a significant lack of fit to the data set. The median 5th percentile of the log-logistic SSD was divided by a factor of 2 to calculate the acute criterion for fipronil-sulfone.

Fipronil-desulfinyl: An acute criterion could not be calculated for fipronil-desulfinyl because the taxa requirements were not met for using either a species sensitivity distribution or an assessment factor to calculate an acute criterion. The data set contained toxicity values for bluegill sunfish and rainbow trout, neither of which are known to be relatively sensitive species for fipronil and its degradates, thus the use of an assessment factor to calculate a criterion was not recommended.

Fipronil-carboxamide: An acute criterion could not be calculated for fipronil-carboxamide because the taxa requirements were not met for using either a species sensitivity distribution or an assessment factor to calculate an acute criterion.

The review should focus on Section 7.1 (Acute Water Quality Criteria) of the Draft Water Quality Criteria Report, and Section 3-3.0 of the UC Davis Methodology is the related reference.

4. The chronic water quality criteria, if attained, are likely to protect aquatic organisms from harmful physiological effects that result from long-term (i.e., any long period or a duration that covers a substantial portion of an organism's life span) exposures to fipronil and/or its degradates and the criteria calculated are technically valid.
    a. The chronic water quality criteria derived via acute-to-chronic ratios are valid and protective and are not overly conservative.

To calculate chronic criteria with the UC-Davis method a species sensitivity distribution is fit to the chronic data set if five required taxa are available. In many cases, there are too few data to fit a statistical distribution, and instead an acute-to-chronic ratio (ACR) is used to calculate a chronic criterion. Acute-to-chronic ratios for individual species are calculated with empirical data for the constituent of interest as the acute toxicity value (e.g., LC50) divided by the chronic toxicity value (e.g., the geometric mean of the NOEC and LOEC). If empirical ACRs are available for one invertebrate, one fish, and one additional important species, then these are used to calculate a multispecies ACR. The chronic criterion is then calculated using the 5th percentile (or whichever percentile was used to calculate the acute criterion) of the acute SSD (or if estimated using an assessment factor) and the multispecies ACR. If empirical ACRs are not available for a given pesticide, then a default ACR is used. The default ACR is 11.4 and was derived based on multispecies ACRs for 10 pesticides, including organochlorines, organophosphates, and pyrethroids.

Fipronil: An acute-to-chronic ratio was used to calculate the chronic criterion using the acute 5th percentile estimate (based on acute toxicity data for fipronil) and an acute-to-chronic ratio calculated based on the geometric mean of the fipronil ACR for *Daphnia magna* and two default ACRs. Two default ACRs were included because there were no paired acute and chronic data for fipronil that fulfilled the requirements for an ACR for a fish and a third important species. The default acute-to-chronic ratio is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The default acute-to-chronic ratio is a conservative approach for calculating the fipronil chronic criterion, which is reasonable because little chronic toxicity data is available for this pesticide.

Fipronil-sulfide: An acute-to-chronic ratio was used to calculate the chronic criterion using the acute 5th percentile estimate (based on acute toxicity data for fipronil-sulfide) and an acute-to-chronic ratio calculated based on the geometric mean of the fipronil-sulfide ACR for *Daphnia magna* and two default ACRs. Two default ACRs were included because there were no paired acute and chronic data for fipronil-sulfide that fulfilled the requirements for an ACR for a fish and a third important species. The default acute-to-chronic ratio is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The default acute-to-chronic ratio is a

conservative approach for calculating the fipronil-sulfide chronic criterion, which is reasonable because little chronic toxicity data is available for this pesticide.

Fipronil-sulfone: An acute-to-chronic ratio was used to calculate the chronic criterion using the acute 5th percentile estimate (based on acute toxicity data for fipronil-sulfone) and an acute-to-chronic ratio calculated based on the geometric mean of the fipronil-sulfone ACR for *Daphnia magna* and two default ACRs. Two default ACRs were included because there were no paired acute and chronic data for fipronil-sulfone that fulfilled the requirements for an ACR for a fish and a third important species. The default acute-to-chronic ratio is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The default acute-to-chronic ratio is a conservative approach for calculating the fipronil-sulfone chronic criterion, which is reasonable because little chronic toxicity data is available for this pesticide.

Fipronil-desulfinyl: A chronic criterion could not be calculated for fipronil-desulfinyl because an acute 5th percentile value or estimate was not available for this degradate, thus an acute-to-chronic ratio could not be applied for calculation of a chronic criterion.

Fipronil-carboxamide: A chronic criterion could not be calculated for fipronil-carboxamide because an acute 5th percentile value or estimate was not available for this degradate, thus an acute-to-chronic ratio could not be applied for calculation of a chronic criterion.

The review should focus on Section 7.2 (Chronic Water Quality Criteria) of the Draft Water Quality Criteria Report, and Section 3-4.3 of the UC Davis Methodology is the related reference.

5. The interim acute bioavailable sediment quality criteria were conservatively derived and denote a concentration protective of the most sensitive aquatic life while highlighting data gaps and future studies needed for more robust analysis. Due to the limitations on available data and remaining uncertainty in the UC Davis Sediment Criteria Derivation Methodology, the interim acute bioavailable sediment quality criteria should not be utilized as regulatory values.
    a. The interim acute bioavailable sediment quality criteria for fipronil and its degradates are not recommended to be utilized as regulatory values because they may be overly conservative because the data available only account for two species, one of which is known to be particularly sensitive to fipronil and degradates based on the aqueous data sets, and when few data are available the derivation method is conservative to account for cases in which it is unknown whether the available species are relatively sensitive.

The UC Davis Sediment Criteria Derivation Methodology remains in draft form and was not finalized because of a lack of large and diverse spiked-sediment toxicity test data sets to use to develop and vet the method. However, to provide information to environmental resource managers and gather existing data for use in further developing

the method, spiked-sediment toxicity data was collected and evaluated for fipronil and its degradates and used to derive interim sediment criteria according to the draft method where appropriate. The authors conclude that the interim bioavailable sediment quality criteria (BSQC) are not appropriate for use as regulatory values because of remaining uncertainty in the UC Davis Sediment Criteria Derivation Methodology. The interim BSQC are provided to share all available information on the toxicity of fipronil and its degradates with environmental resource managers.

Fipronil: An assessment factor was used with the available acute sediment toxicity data for fipronil to calculate the interim acute BSQC. The lowest acute toxicity value for fipronil was for the midge *Chironomus dilutus*, which was divided by an assessment factor of 32 to estimate the 5th percentile of the species sensitivity distribution for fipronil. The estimated 5th percentile value was then divided by 2 to calculate the interim acute BSQC. The assessment factor used is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The assessment factor of 32 was used because the acute fipronil data set fulfilled one of the five required taxa to fit a species sensitivity distribution. The fipronil data set did not contain a benthic crustacean, which is given as a requirement for using the assessment factor approach in the UC Davis Sediment Method because a benthic crustacean toxicity value is typically available and because it is likely to be relatively sensitive to pesticides. Although there was no benthic crustacean toxicity value available for fipronil, the authors concluded that it was reasonable to use the assessment factor approach because data for a known sensitive species (chironomid) was available, thus the use of an assessment factor should result in a criterion that provides reasonable protection for all aquatic organisms. Sediment data sets for fipronil-sulfide, fipronil-sulfone, and fipronil-desulfinyl indicate that benthic crustaceans (i.e., *Hyallela azteca*) are less sensitive to these compounds than chironomids, and the same trend is exhibited in the water toxicity data sets. Using an assessment factor is a conservative approach for calculating the fipronil interim acute BSQC, which is reasonable because so little acute toxicity data is available for this pesticide.

Fipronil-sulfide: An assessment factor was used with the available acute sediment toxicity data for fipronil-sulfide to calculate the interim acute BSQC. The lowest acute toxicity value for fipronil-sulfide was for the midge *Chironomus dilutus*, which was divided by an assessment factor of 12 to estimate the 5th percentile of the species sensitivity distribution for fipronil-sulfide. The estimated 5th percentile value was then divided by 2 to calculate the interim acute BSQC. The assessment factor used is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The assessment factor of 12 was used because the acute fipronil-sulfide data set fulfilled two of the five required taxa to fit a species sensitivity distribution. Using an assessment factor is a conservative approach for calculating the fipronil-sulfide interim acute BSQC, which is reasonable because so little acute toxicity data is available for this degradate.

Fipronil-sulfone: An assessment factor was used with the available acute sediment toxicity data for fipronil-sulfone to calculate the interim acute BSQC. The lowest acute

toxicity value for fipronil-sulfone was for the midge *Chironomus dilutus*, which was divided by an assessment factor of 12 to estimate the 5th percentile of the species sensitivity distribution for fipronil-sulfone. The estimated 5th percentile value was then divided by 2 to calculate the interim acute BSQC. The assessment factor used is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The assessment factor of 12 was used because the acute fipronil-sulfone data set fulfilled two of the five required taxa to fit a species sensitivity distribution. Using an assessment factor is a conservative approach for calculating the fipronil-sulfone interim acute BSQC, which is reasonable because so little acute toxicity data is available for this degradate.

Fipronil-desulfinyl: An assessment factor was used with the available acute sediment toxicity data for fipronil-desulfinyl to calculate the interim acute BSQC. The lowest acute toxicity value for fipronil-desulfinyl was for the midge *Chironomus dilutus*, which was divided by an assessment factor of 12 to estimate the 5th percentile of the species sensitivity distribution for fipronil-desulfinyl. The estimated 5th percentile value was then divided by 2 to calculate the interim acute BSQC. The assessment factor used is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The assessment factor of 12 was used because the acute fipronil-desulfinyl data set fulfilled two of the five required taxa to fit a species sensitivity distribution. Using an assessment factor is a conservative approach for calculating the fipronil-desulfinyl interim acute BSQC, which is reasonable because so little acute toxicity data is available for this degradate.

Fipronil-carboxamide: An interim acute BSQC could not be calculated for fipronil-carboxamide because there were no acute sediment toxicity values available for this degradate.

The review should focus on Section 8.1 (Interim acute bioavailable sediment quality criteria) of the Draft Water Quality Criteria Report, and Section 3.5.2 of the UC Davis Sediment Methodology is the related reference.

6. The interim chronic bioavailable sediment quality criteria were conservatively derived and denote a concentration protective of the most sensitive aquatic life while highlighting data gaps and future studies needed for more robust analysis. Due to the limitations on available data and remaining uncertainty in the UC Davis Sediment Criteria Derivation Methodology, the interim chronic bioavailable sediment quality criteria should not be utilized as regulatory values.
    a. The interim chronic bioavailable sediment quality criteria for fipronil and its degradates are not recommended to be utilized as regulatory values because they may be overly conservative because the data available only account for two species, one of which is known to be particularly sensitive to fipronil and degradates based on the aqueous data sets, and when few data are available the derivation method is conservative to account for cases in which it is unknown whether the available species are relatively sensitive.

The UC Davis Sediment Criteria Derivation Methodology remains in draft form and was not finalized because of a lack of large and diverse spiked-sediment toxicity test data sets to use to develop and vet the method. However, to provide information to environmental resource managers and gather existing data for use in further developing the method, spiked-sediment toxicity data was collected and evaluated for fipronil and its degradates and used to derive interim sediment criteria according to the draft method where appropriate. The authors conclude that the interim bioavailable sediment quality criteria (BSQC) are not appropriate for use as regulatory values because of remaining uncertainty in the UC Davis Sediment Criteria Derivation Methodology. The interim BSQC are provided to share all available information on the toxicity of fipronil and its degradates with environmental resource managers.

Fipronil: An acute-to-chronic ratio was used to calculate the interim chronic BSQC using the acute 5th percentile estimate (based on acute toxicity data for fipronil) and the default acute-to-chronic ratio. The default acute-to-chronic ratio is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The default acute-to-chronic ratio is a conservative approach for calculating the fipronil interim chronic BSQC, which is reasonable because little chronic toxicity data is available for this pesticide.

Fipronil-sulfide: An acute-to-chronic ratio was used to calculate the interim chronic BSQC using the acute 5th percentile estimate (based on acute toxicity data for fipronil-sulfide) and the default acute-to-chronic ratio. The default acute-to-chronic ratio was used because there were no paired acute and chronic data for fipronil-sulfide that could be used for an acute-to-chronic ratio. The default acute-to-chronic ratio is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The default acute-to-chronic ratio is a conservative approach for calculating the fipronil-sulfide interim chronic BSQC, which is reasonable because little chronic toxicity data is available for this degradate.

Fipronil-sulfone: An acute-to-chronic ratio was used to calculate the interim chronic BSQC using the acute 5th percentile estimate (based on acute toxicity data for fipronil-sulfone) and the default acute-to-chronic ratio. The default acute-to-chronic ratio was used because there were no paired acute and chronic data for fipronil-sulfone that could be used for an acute-to-chronic ratio. The default acute-to-chronic ratio is based on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The default acute-to-chronic ratio is a conservative approach for calculating the fipronil-sulfone interim chronic BSQC, which is reasonable because little chronic toxicity data is available for this degradate.

Fipronil-desulfinyl: An acute-to-chronic ratio was used to calculate the interim chronic BSQC using the acute 5th percentile estimate (based on acute toxicity data for fipronil-desulfinyl) and the default acute-to-chronic ratio. The default acute-to-chronic ratio was used because there were no paired acute and chronic data for fipronil- desulfinyl that could be used for an acute-to-chronic ratio. The default acute-to-chronic ratio is based

on organic pesticides, but does not include any chemicals in the same chemical class as fipronil. The default acute-to-chronic ratio is a conservative approach for calculating the fipronil- desulfinyl interim chronic BSQC, which is reasonable because little chronic toxicity data is available for this degradate.

Fipronil-carboxamide: An interim chronic BSQC could not be calculated for fipronil-carboxamide because an acute 5th percentile value or estimate was not available for this degradate, thus an acute-to-chronic ratio could not be applied for calculation of a chronic criterion.

The review should focus on Section 8.2 (Interim chronic bioavailable sediment quality criteria) of the Draft Water Quality Criteria Report, and Section 3.5.2 of the UC Davis Sediment Methodology is the related reference.

7. The water quality criteria were not adjusted based on water quality effects, specific ecotoxicity data, or effects in other environmental compartments; the derived criteria are scientifically sound and technically valid based on the available information on these topics.

The UC Davis Method provides guidance on several topics that may result in adjustments to the criteria that are initially calculated. This guidance includes incorporating documented water quality effects quantitatively into the final criteria, comparison to toxicity data for sensitive species, threatened and endangered species, and ecosystem effects (e.g., from mesocosm studies), and checking that the water quality criteria concentrations would not lead to environmental harm in sediment or air, or due to bioaccumulation up the food chain. In many cases, insufficient information is available to fully assess these categories or where information was available, it did not indicate that the criteria required adjustment. No adjustments were made to the criteria, which, the authors conclude is scientifically sound and technically valid.

The review should focus on Sections 9, 10, and 11 of the Draft Water Quality Criteria Report. Sections 3-5.0, 3-6.0, and 3-7.0 of the UC Davis Methodology are the related references.

8. The assumptions, limitations, and uncertainties regarding derivation of the water quality criteria are accurate and include all factors that significantly affect the resulting criteria.

The assumptions, limitations, and uncertainties involved in criteria derivation may provide important information to environmental managers regarding the accuracy and confidence in the criteria. All significant assumptions, limitations, and uncertainties are clearly identified and none are overlooked.

A major limitation for all of the criteria was the low quantity of high quality toxicity data. There were sufficient data to use a species sensitivity distribution to calculate acute

water quality criteria for two constituents, but all other compounds had too few data to use a species sensitivity distribution for criteria derivation.

The review should focus on Section 12.1 (Assumptions, Limitations, and Uncertainties) of the Draft Water Quality Criteria Report, and Section 3-4.3 of the UC Davis Methodology is the related reference.

9. The acute and chronic water quality criteria are appropriate to protect aquatic organisms in the entire Central Valley of California, including the Sacramento River and San Joaquin River Basins as well as the Tulare Lake Basin.

The UC Davis Method was originally intended to provide protection for aquatic life in the Sacramento River and San Joaquin River Basins because that was the geographic scope of interest when the project was initiated. However, the authors conclude that these criteria would be appropriate for any freshwater ecosystem in North America, unless species more sensitive than are represented by the species examined in the development of the present criteria are likely to occur in the ecosystems of interest. The species used to develop the criteria are not limited to those that occur in the Sacramento River and San Joaquin River Basins and include any species that is from a Family that is represented in North America.

<u>The Big Picture</u>

Reviewers are not limited to addressing only the specific topics presented above. Additionally, we invite you to contemplate the following “Big Picture” questions.

(a) In reading the Draft Water Quality Criteria Report, are there any additional scientific issues that should be part of the scientific portion of the water quality criteria derivation that are not described above? If so, comment with respect to the derivation of water quality criteria.

(b) Taken as a whole, are the scientific portions of the water quality criteria derivations based upon sound scientific knowledge, methods, and practices?

Attachment 3

WATER QUALITY CRITERIA FOR THE PESTICIDE FIPRONIL FOR CALIFORNIA'S CENTRAL VALLEY

Individuals Involved in Development of the Water Quality Criteria

UC-Davis Water Quality Criteria Derivation Methodology

- Patti TenBrook, Ph.D., U.S. Environmental Protection Agency
- Amanda Palumbo, Ph.D., State Water Resources Control Board
- Tessa Fojut, Ph.D., Central Valley Regional Water Quality Control Board
- Ron Tjeerdema, Ph.D., University of California - Davis
- Joe Karkoski, Central Valley Regional Water Quality Control Board
- Danny McClure, Central Valley Regional Water Quality Control Board
- Paul Hann, State Water Resources Control Board

Scientific Reviewers of the UC-Davis Method

- Larry Curtis, Ph.D., Oregon State University
- Evan Gallagher, Ph.D., University of Washington
- John Knezovich, Ph.D., Lawrence Livermore National Laboratory and University of California Davis
- Marshall Lee, California Department of Pesticide Regulation

Public Commenters on the UC-Davis Method

- Roberta Firoved, California Rice Commission
- Dee Ann Staats, Croplife America
- Warren Tellefson, Central Valley Clean Water Agency
- Nick Poletika, Dow AgroSciences
- William Thomas, Dow AgroSciences
- William Warren-Hicks, EcoStat
- Stephen Clark, Pacific EcoRisk
- Allen Short, San Joaquin Tributary Association
- Wendell Kido, Sacramento Regional County Sanitation District
- Lenwood Hall, University of Maryland
- Debra Denton, U.S. Environmental Protection Agency
- Joe Beaman, U.S. Environmental Protection Agency
- Nasser Dean, Western Plant Health Association
- Renee Pinel, Western Plant Health Association

Draft UC-Davis Sediment Quality Criteria Derivation Methodology

- Tessa Fojut, Ph.D., Central Valley Regional Water Quality Control Board
- Martice Vasquez, Ph.D., California Department of Fish and Wildlife
- Kelly Trunnelle, Ph.D., University of California – Davis
- Ronald S. Tjeerdema, Ph.D., University of California - Davis

Scientific Reviewers of the UC-Davis Sediment Method

- Steve Bay, Southern California Coastal Water Research Project
- G. Allen Burton, Ph.D., University of Michigan
- Chris Ingersoll, Ph.D., U.S. Geological Survey
- John Knezovich, Ph.D., Lawrence Livermore National Laboratory, UC-Davis
- Peter Landrum, Ph.D., Scientist Emeritus, National Oceanic and Atmospheric Administration
- Lisa Nowell, Ph.D., U.S. Geological Survey

UC-Davis Water Quality Criteria Report

- Julie Bower, Ph.D., University of California – Davis
- Ron Tjeerdema, Ph.D., University of California – Davis

Attachment 4

WATER QUALITY CRITERIA FOR THE PESTICIDE FIPRONIL FOR CALIFORNIA'S CENTRAL VALLEY

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